

From Wheat to Bread

*A lesson from the New Jersey Agricultural Society
Learning Through Gardening program*

OVERVIEW: How many of your students really understand that all the things they eat made from flour – bread, pizza dough, cake, cookies, crackers, rolls – actually come from a plant? In this lesson, students will plant wheat seeds to observe how wheat grows, examine the parts of the wheat plant and parts of the wheat seed, and learn the difference between white bread and whole wheat bread.



GRADES: 3-5

OBJECTIVES: The student will be able to:

- Identify wheat as the plant that is the source of much of the flour we eat.
- Identify the parts of the wheat plant.
- Identify the parts of the wheat seed.
- Explain the difference between whole grain and refined grain and the nutritional benefits of each.

MATERIALS:

Wheat seeds

Potting soil

Container for planting seeds

Anatomy of a Wheat Plant sheet, one per student

Parts of a Wheat Seed sheet, one per student

Wheat: From Field to Mill to Table sheet, one per student

White Bread Versus Whole Grain: What's Healthier? What's the Difference? YouTube video: <https://www.youtube.com/watch?v=418KSrmpMwc>

INTRODUCTION:

Ask your students to brainstorm a list of food they eat that is made from flour. Ask students if they know where this flour comes from. Explain that today they will plant some wheat seeds to see how wheat grows and learn the difference between white and whole wheat bread.

PROCEDURE:

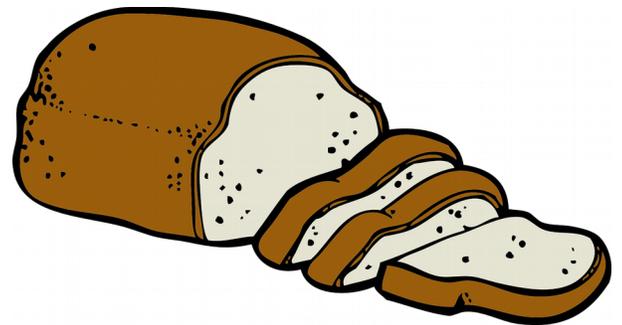
Depending on how many wheat seeds you have, demonstrate the seed planting to the whole class or place students in small groups. Fill any container – milk or yogurt carton, berry container, plant pot, etc. – with potting soil. Make sure the container has drainage holes in the bottom. Sprinkle wheat seeds liberally on top of soil. Cover seeds lightly with soil, about ¼-inch deep. Moisten the soil – a spray bottle is easy to use.

Place the container in a sunny area, and check the moisture level of the soil frequently so the seeds don't dry out. Water lightly when needed. The seeds should germinate in two to three days, and sprouts should be visible within a week. Allow your students to observe the growth of the wheat seeds for at least a month. They can record their observations in science journals.

Distribute the *Wheat: From Field to Mill to Table* sheet. Ask students in small groups to read and discuss this information about wheat. Ask them to list facts that were new to them or that they found particularly interesting. Ask the groups to report their thoughts to the whole class.

Distribute the *Anatomy of a Wheat Plant* sheet. Ask students to discuss in small groups how the parts of a wheat plant are the same or different from the parts of other edible plants with which they are familiar.

Tell students that it is the seeds of the wheat plant that we eat. The seed is ground into flour. Distribute and discuss the *Parts of a Wheat Seed* sheet. Ask students if they are familiar with the term *whole grain*. Ask them if they know what this means. Ask if whole grain bread is different from white bread. Show the YouTube video *White Bread Versus Whole Grain: What's Healthier? What's the Difference?* that can be found at this link: <https://www.youtube.com/watch?v=418KSrmpMwc>



After watching the video discuss with students what they have learned about white and whole grain bread.

EVALUATION:

The student can answer the question, "Where does your bread come from?" and describe the parts of a wheat plant and wheat seed. The student can explain the difference between white bread and whole wheat bread.

EXTENSIONS:

Ask students to research and show on a map the states are the biggest wheat producers. Ask students to research and show on a map the countries are the biggest wheat producers.

Ask students to research the history of wheat farming and flour milling.

Although many of the bread products we eat are made from flour, there are many other types of flour. Ask students to brainstorm what other plants flour might be made from: oats, corn, rice, potatoes, etc. Arrange a taste test for students to compare wheat flour to other types of flour.

Make Bread in a Bag (See recipe below.)

Make wheatgrass smoothies. The young wheatgrass sprouts can be used to make smoothies. Wheatgrass can be bitter, however, so if you want your students to try it, be sure to combine it with something sweet. Here is a sample recipe:

2 cups of wheatgrass. Plain wheatgrass chops up pretty well in a blender.

1 cup of your favorite fruit; frozen, or if raw fruit is used - include 1 cup of ice

1 carrot

1 Tbs. lemon juice

1 Tbs. agave or other sweetener

Add up to 1/2 cup cold water to adjust consistency.



Notes: Apples and carrots go great with wheatgrass! If using raw apples, use 2 cups raw apples plus one cup apple or other fruit juice.

New Jersey Learning Standards

Science: 3:LS1.B 4:LS1.A 5:LS2.A

Social Studies: 3-5: 6.1.5.GeoHE.2, 6.1.5.EconEM.1, 2

English Language Arts: 3:RI.3.1,2,4 4:RI.4.1,2,4 5:RI.5.1,2,4

Wheat: From Field to Mill to Table

Bread has been an important part of the human diet since early times. Wheat has been discovered in pits where human settlements existed 8,000 years ago. Loaves baked over 5,000 years ago have been found in ancient Egyptian tombs. Bread provided ancient civilizations with a reliable food source.

The wheat plant has four basic parts—roots, stem, leaves, and head. The *roots* anchor the plant in the soil, absorbing water and nutrients and transporting them to the stem. The *stem* supports the head and helps transport nutrients and water throughout the plant. The *leaves* are responsible for *photosynthesis*. The *head* of the wheat plant contains the wheat seeds, also referred to as kernels.

Wheat flour is made from the kernels or wheat seed. A wheat kernel contains three parts—the *bran*, *germ*, and *endosperm*. The *bran* is the hard outer covering of the kernel. The *germ* is the embryo that will sprout into a new plant. The *endosperm* is the germ's food supply. It provides essential energy to the young wheat plant, allowing the plant to send roots and send up stems.



During the milling process, the germ and bran are often separated from the flour. The germ is removed because its fat content limits the flour's shelf-life. The bran is removed to give the flour its white color and fluffy texture. This is called *refined flour*.

Refined flour is not as nutritious as whole-grain flour that contains both germ and bran. The germ contains healthy fats, and bran contains protein. Both the germ and bran contain B vitamins, minerals and fiber. Refined wheat contains just the wheat seed's endosperm, which only contains carbohydrates.

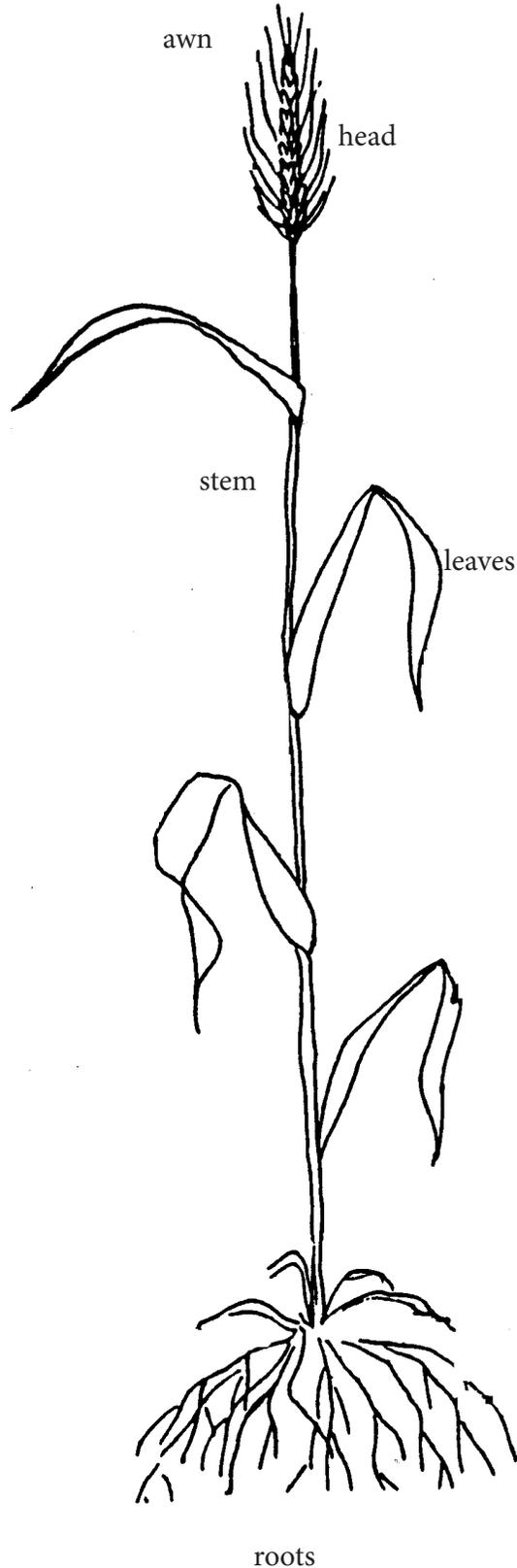
In Neolithic times, stones were used to crush grain into coarse flour. In the Stone Age, hand-powered mills with a rotating circular stone on top and a stationary stone on the bottom were used to grind grain.

In the 18th century, automated stone wheels powered by wind or water were used to produce flour. These mills still used flat circular stones to crush the grain. The invention of the roller mill in the middle of the 19th century, which used metal cylinders instead of the flat circular stones, to crush grain increased the productivity of flour mills. Commercial flour mills today still use the roller mill.

When wheat arrives at the mill, water is added to the grain in order to toughen the outer part of the wheat and soften the inner part. The wheat then rests for about 12 hours. Steel rollers break open the grain to release and separate the endosperm from the bran and the germ. The starchy endosperm is ground and sifted several times to make white, all-purpose flour.

When making whole wheat flour, the bran and germ is put back into the white flour at the end of the milling process. The flour is then packed into bags to be transported to stores, bakeries, and food processing plants.

Anatomy of a Wheat Plant



The wheat plant has four basic parts: the head, stem, leaves and roots. Wheat plants grow to be about 2-4 feet tall.

The **awn** is a slender, bristle-like attachment of a wheat plant, such as those found at the tips of the spikelets in many grasses.

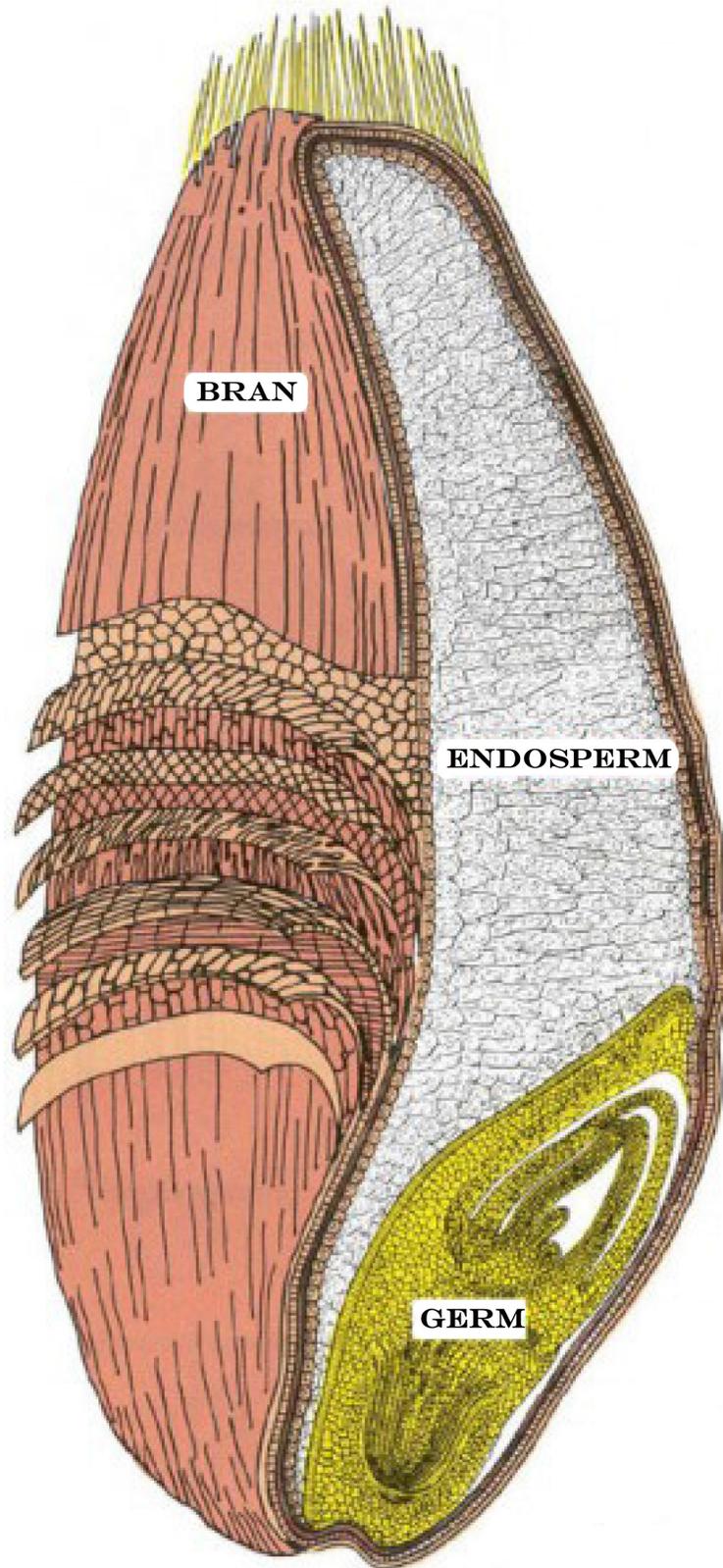
The **head** contains kernels or the wheat seeds.

The **stem** supports the head and helps transport nutrients and water throughout the plant.

The **leaves** are responsible for photosynthesis, the process in which green plants produce simple carbohydrates by using carbon dioxide, hydrogen and a light source, usually the sun.

The **roots** anchor the plant in the soil and absorb water and nutrients from the soil and transport them to the stem.

Parts of a Wheat Seed



Bread in a Bag Recipe

Ingredients and Materials for each loaf

½ cup all purpose flour	plastic wrap
2 cups whole wheat flour	cooking oil spray
warm water	heavy duty ziplock bags
2 tablespoons sugar	food handling gloves
1 package yeast (2 1/4 teaspoons) <i>Quick-rise yeast will speed the process</i>	various measuring cups and spoons
2 teaspoons salt	cookie sheets
one tablespoon vegetable oil	

Directions

In a one-gallon heavy-duty ziplock bag, mix:

- ½ cup all purpose flour
- 1 package or 2 ¼ teaspoons yeast
- ½ cup warm water
- 2 tablespoons sugar.

Close the bag and knead it with fingers until the ingredients are completely blended. Leave the bag closed, with the contents in the corner, and let rest 10 minutes. You can eliminate this wait by using instant yeast. Then add:

- 2 cups whole wheat flour
- ¾ cup warm water
- 1 tablespoon vegetable oil
- 2 teaspoons salt

Mix well. Add enough all-purpose flour to make a stiff dough, about 1 or 1 ½ cups. Close the bag and knead it (You may need to remove some air from the bag.) Add more flour until dough no longer sticks to the bag.

Spray the students' hands or food handlers gloves with oil so there will be no sticking. Open the bag and allow the dough to fall out onto clean or gloved hands. Form the dough in to a loaf, and place onto cookie sheet. Cover the loaves with sprayed plastic wrap and allow to rise 30 (quick-rise yeast) to 45 minutes.

Bake for 30-35 minutes in a 350 degree oven.

